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(72) Inventor JEREMY ROBERT GODDIN

(19)

(54) SECURING RIGID MEMBER SUCH AS A KERBSTONE TO A SUPPORT

(71) We, NOVATION LIMITED, a British Company, of 'Heyworth House,' 40A Kenilworth Road, Coventry, West Midlands CV3 6PG, hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statment:—.

The invention relates to a method of securing a rigid member to a support, and to a rigid member having keying means for attachment to a support.

Rigid members, such as kerbstones, are commonly produced by moulding concrete and are usually made in fixed lengths. When kerbstones are laid, it is necessary to ensure that any tendency of the kerbstone being tipped over, for instance by the impact of a vehicle wheel, is resisted. For this purpose kerbstones have previously been embedded in concrete below the level of the adjacent road surface This means that much of each kerbstone is below road level simply to ensure that the remainder of the kerbstone is sufficiently stable. Therefore in order to produce existing types of kerbstones far more concrete is required than that which forms the portion of the kerbstone normally visible above the road surface. A further disadvantage inherent with existing kerbstones is that it is impossible to lay them around a sharp bend without either cutting them into short lengths, or producing curved kerbstones in a mould. It is generally impracticable to produce kerbstones in the very wide range of curvatures, and therefore it is often necessary to form the bend to fit the kerbstones. In addition, as with all concrete moulding, there is the ever present risk of producing faulty end products or damaging the product as it is removed from the mould. Such damaged or faulty products are often of little use and add to the already high cost of producing concrete products, such as kerbstones, in that way. Furthermore, skilled labour is required for the time consuming and expensive task of laying each kerbstone individually. After the kerb has been laid it is susceptable to damage both by weathering action on the naturally porous surface of the kerbstones, and by individual kerbstones being overturned or broken through sudden engagement by vehicle wheels.

An object of the invention is to improve the attachment of a rigid member, such as a kerbstone, to a support.

According to one aspect of the invention a method of securing a rigid member to a support includes positioning a keying member so that it extends through a wall of a preformed self-supporting tubular member which defines an outer surface of the rigid member, filling the preformed tubular member with a settable mass of flowable material to form a set core gripping a first portion of the keying member extending into the material of the preformed tubular member, and securing a second portion of the keying member extending from the exterior of the preformed tubular member to the support. The method may include securing the second portion of the keying member to the support before the settable mass of flowable material is introduced into the preformed tubular member. The method may include supporting the preformed tubular member prior to the introduction of the settable mass of flowable material. The method may include bending the preformed tubular member on a bed of settable material, comprising the support, with the second portion of the keying member extending into the bed to be gripped by the bed material when set.

The method preferably includes arranging at least one reinforcing member inside the preformed tubular member prior to the introduction of the settable mass of flowable material. The method may include bending the preformed tubular member longitudinally to a predetermined curvature and using the keying member to hold the preformed tubular member in this curved condition

until its core has set. The method may also include supporting the preformed tubular member in a mould of complementary shape whilst its core is setting.

According to another aspect of the invention, a rigid member includes a preformed self supporting tubular member having a wall defining an outer surface of the rigid member, a keying member extending through the wall so that a first portion of the keying member extends into the interior of the preformed tubular member and is gripped by a set core of previously flowable material within the preformed tubular member, and second portion of the keying member extends from the exterior of the preformed tubular member for attachment to a support for the rigid member. The first portion of the keying member preferably has an aperture engaged by a portion of the set core. The second portion of the keying member preferably has an aperture for engagement by the support. The preformed tubular member is preferably formed by extrusion. The keying member preferably extends through a slot in the wall of the preformed tubular member. The keying member may be a ring extending through the slot in the wall of the preformed tubular member. A longitudinal series of keying members may be positioned along the preformed tubular member.

A reinforcing member preferably extends longitudinally within the preformed tubular member and is embedded in the set core. The reinforcing member may be in the form of a coil or may extend diagonally between opposite internal faces of the preformed tubular member.

The preformed tubular member may define one or more longitudinal conduits which are not filled with the core of previously flowable material. In such a case, a portion of the preformed tubular member wall defining the outer surface of the rigid member may also define a wall of one of the longitudinal conduits. This wall of the preformed tubular member may be pierced to provide access to the longitudinal conduits. The wall of the preformed tubular member may define any external channel.

A series of preformed tubular members may be connected togeether by end-to-end connectors. In this event, the end-to-end connectors may define an inlet means for the introduction of the flowable material into the interior of the preformed tubular member, and outlet means to ensure that each preformed tubular member is appropriately filled.

The preformed tubular member is preferably formed as one-piece extrusion. The preformed tubular member may be longitudinally curved.

The preformed tubular member may define the outer surface of a kerbstone, and the second portion of the keying means is set in a bed of concrete, or the like, comprising the support. In this event, the preformed tubular member may define a longitudinal rebate along an upper edge for supporting the adjacent edges of paving slabs.

In the case where the preformed tubular member defines a longitudinal conduit, the longitudinal conduit may form a drainage channel communicating through a longitudinal slot with an upper surface of the preformed tubular member.

Other aspects and features of the invention will be apparent from the following description and the accompanying drawings.

The invention will now be described, by way of example only, with reference to the accompanying drawings in which:—

Figure 1 is a perspective view of a preformed tubular member containing concrete, showing the concrete partly cutaway;

Figure 2 is a view similar to Figure 1 showing the preformed tubular member housing a reinforcing member prior to the introduction of the concrete;

Figure 3 is a cross-section of the preformed tubular member shown in Figure 2 showing the preformed tubular member filled with concrete;

Figure 4 is a view similar to Figure 2 illustrating an alternative form of reinforcing member;

Figure 5 is a cross-section of the preformed tubular member shown in Figure 4 showing the preformed tubular member filled with concrete;

Figure 6 illustrates the manner in which preformed tubular members of the kind shown in Figures 1 to 5 can be interconnected to define a kerb;

Figures 7 to 11 illustrate various alternative cross-sections of preformed tubular members for use as kerbstones.

With reference firstly to Figures 1 a preformed tubular member 10, which is preferably formed by extrusion as a one-piece extrusion of flexible plastics material, comprises a self-supporting wall defining an outer surface of a rigid member. The wall has a base 11 formed with transverse slots 12 of dumb-bell shape that are spaced apart longitudinally of the preformed tubular member 10. The slots receive and locate rings 13 as shown so that part of each ring is within the tubular preform 10 and part projects below the base 11. Each ring 13 constitutes a keying member whereby the preformed tubular member 10 can be secured to a surface, a structure or, as shown in Figures 1 to 5, to a bed of settable

material 15 such as concrete. After the material 15 has set to lock the rings 13 and thus the preformed tubular member 10 in position, a settable mass of flowable material, such as concrete 14, is introduced into one end of the preformed tubular member 10 to flow along the preformed tubular member towards its opposite end until a predetermined length of the preformed tubular member is occupied by the set core of concrete. As the concrete 14 flows along the preformed tubular member it envelops the rings 13 to lock the concrete filled preformed tubular member 10 to the bed 15. It will be appreciated that each ring constitutes a keying member which extends through the wall of the preformed tubular member such that a first portion of the keying member extends into the interior of the preformed tubular member and is gripped by the set core within the preformed tubular member and such that a second portion of the keying member extends from the exterior of the rigid member for attachment to the support surface, structure or bed of settable material. The portion of the keying ring 13 within the preformed tubular member defines a generally part-cylindrical aperture through which the concrete flows when wet so that the set core engages this portion of the keying ring. Similarly the portion of the keying ring 13 extending from the exterior of the preformed tubular member defines a generally part-cylindrical aperture through which the concrete of the bed 15 flows when wet so that the set bed of concrete engages this portion of the keying ring.

As shown in Figures 2 and 3, a helical steel reinforcing member 16 may be positioned in the preformed tubular member prior to introducing the concrete 14. The reinforcing member 16 would normally be placed in position prior to inserting the rings 13 in the slots 12. As shown in Figure 3, the concrete 14 keys the reinforcing member 16 to the rings 13.

Figures 4 and 5 illustrate a zig-zag shaped reinforcing member 17 which has the advantage that it can be positioned in the preformed tubular member 10 after the rings 13 have been inserted in the slots 12. As seen clearly in Figure 5, the reinforcing member 17 extends between diagonally opposite corners, 18, 19 of the preformed tubular member 10.

Although the concrete has been described as being introduced into one end of the preformed tubular member 10, it could be introduced into an inlet aperture spaced from the said one end in which case the concrete could be allowed to flow from the inlet aperture towards both ends of the preformed tubular member 10 simultaneously.

Due to the flexible nature of the preformed tubular member 10 before the concrete 14 is introduced, it is possible to flex the preformed tubular member 10 longitudinally to a desired curvature before the bed 15 sets, whereby the rings 13 will hold the preformed tubular member 10 at this curvature after the bed 15 has solidified. The bed 15 then serves to support the preformed tubular member 10 whilst the concrete 14 is wet. The reinforcing members 16 and 17 are designed to permit easy flexing of the preformed tubular member before the concrete 14 is introduced.

In Figure 6, a plurality of preformed tubular members 10 are arranged end-to-end with connectors 20 located between them. Each connector 20 is of similar cross-sectional shape to the preformed tubular members 10 and has spigots 22 arranged at each end for locating within the adjacent ends of the associated preformed tubular members 10. This construction is particularly advantageous when the preformed tubular members are extruded as they do not need any special end sockets. A closure plate 23 is positioned midway between the ends of each connector 20, and two apertures 24, 25 are formed in the upper surface of each connector to lie either side of the closure plate 23. Assembly of the preformed tubular members 10 as illustrated in Figure 6 provides a simple method of constructing a kerb. As previously mentioned, the preformed tubular members 10 can be flexed to a desired curvature. However, a curved preformed tubular member 10a can be utilised where the kerb is to follow a tight bend, or alternatively an existing straight preformed tubular member 10 can be bent for instance by gentle heating, to fit the required curvature. The preformed tubular members 10, 10a and adaptors 20 are positioned on a bed of wet concrete 26 with the rings 13 (not shown in Figure 6) embedded therein. Unshown spikes may be used to hold the preformed tubular member 10 in position. After the bed 26 has solidified, wet concrete is pumped into one of the apertures, say the aperture 24, of each connector 20 so that the concrete will flow into the adjacent open end of the associated preformed tubular member 10 or 10a and will then flow along the preformed tubular member until it appears at the aperture 25 of the adaptor 20 positioned at the opposite end of the preformed tubular member. When the concrete in the preformed tubular member has set, the preformed tubular members 10 will define a rigid kerb. When the kerb is not level, the concrete is preferably pumped into the lowest point of the preformed tubular members to flow towards a higher point.

This manner of forming a kerb is quicker than the normal method of laying individual concrete kerbstones and enables bends and changes of gradient to be followed far more easily. Furthermore, when laying a kerb of predetermined length, one or more of the plastics preformed tubular members 10 can easily be shortened if necessary without the use of expensive cutting equipment. In addition, the entire kerb defined by the preformed tubular members can, if desired, be positioned above road level on the concrete bed 26, whereas individual concrete kerbstones have to be made of sufficient depth to enable a substantial part of the stones to lie below road level for stability. When each preformed tubular member 10 has been filled with concrete, the apertures 24, 25 can either be closed by a suitable cap or insert before or after the concrete sets, or the concrete in the connectors 20 can be levelled off flush with the upper surfaces of the connectors 20. Alternatively, the apertures 24, 25 could receive posts for supporting a barrier or fence, the posts being located in the apertures pior to the concrete setting in the connectors 20. For countries having large variations in atmospheric temperature, each closure plate may comprise two partitions separated by an air space to permit longitudinal expansion and contraction of the kerb.

Figure 7 illustrates an alternative form of preformed tubular member 10 for use in constructing a kerb, a longitudinal rebate 27 being defined along its upper rear edge for supporting one edge of a paving slab 28 laid behind the kerb.

The preformed tubular member 10 illustrated in Figure 8 is similar to that shown in Figure 7 except that the base 11 is extended to define a step 32. The upper surface of the step 32 is laid level with the surface of an adjacent road surface 33 to define a smooth transition between the road surface and the kerb.

Figure 9 illustrates the manner in which the preformed tubular member 10 can define a longitudinal conduit 29 having an integral thin plastics wall 30 which is a portion of the preformed tubular member wall defining the outer surface of the rigid kerbstone. The conduit is not filled with the flowable material and could be used, for example, for electrical cables, telephone wires or other services, and access thereto could be gained by removing a portion of the wall 30 at convenient intervals along the kerb after the adjacent paving slab 28 has been lifted clear.

Figure 10 illustrates a manner in which a preformed tubular member similar to that shown in Figure 8 can define two conduits 34, 35 in the form of external channels respectively in the side wall of the preformed tubular member abutting the vertical pavement edge, and in the bottom wall of the preformed tubular member. If desired the conduit 35 could constitute a drainage duct for water from the road, the water being ducted to the conduit 35 by suitable passages (not shown).

In Figure 11, the preformed tubular member 10 is formed with a deep step 36 arranged to be positioned below the road surface 23. A channel 37 is defined behind the step and has an integral plastics cover 38 which can be removed after the kerb has been laid so that water from the road can drain into the channel 37. The channel can be connected at convenient intervals to a mains sewer or other drainage system. If desired, the preformed tubular members 10 for use as kerbstones may be provided with a light reflective strip or coloured traffic marking. Such a strip could be incorporated during extrusion or could be secured to the extruded tube. The preformed tubular member illustrated in Figures 6 to 11 may include suitable reinforcing members similar to the members 16, 17 if desired.

When introducing concrete into the preformed tubular member it may occasionally be necessary to introduce it under pressure. In such cases it may be necessary to place the preformed tubular member in a complementary shaped mould so that the preformed tubular member will not distort under pressure. The preformed tubular member can be removed from the mould when the concrete has set.

It will be appreciated that in each of the described embodiments of a continuous skin of flexible plastics or of other material covers the concrete within the tube and consequently protects the concrete surface from deterioration due to natural weathering processes. Special types of concrete, well known in the art, may be used if required.

Although the various embodiments describe the use of concrete within the preformed tubular members it should be understood that other settable masses of flowable material may be used provided they are compatible with the material chosen for the preformed tubular member. For instance various plastics or ceramics foams may be used.

Attention is directed to the claims of our Patent Application No. 22760/75 (Serial No. 1 538 063) which are concerned with the production of curved rigid structural members by filling a preformed tubular member.

WHAT WE CLAIM IS:—

1. A method of securing a rigid member to a support, including positioning a keying

member so that it extends through a wall of a preformed self-supporting tubular member which defines an outer surface of the rigid member, filling the preformed tubular member with a settable mass of flowable material to form a set core gripping a first portion of the keying member extending into the interior of the preformed tubular member, and securing a second portion of the keying member extending from the exterior of the preformed tubular member to the support.

2. A method, according to Claim 1, including securing the second portion of the keying member to the support before the settable mass of flowable material is introduced into the preformed tubular member.

3. A method, according to Claim 1 or 2, including supporting the preformed tubular member on a bed of settable material, comprising the support, with the second portion of the keying member extending into the bed to be gripped by the bed material when set.

4. A method, according to any preceding claim, including bending the preformed tubular member longitudinally to a predetermined curvature and using the keying means to hold the preformed tubular member in this curved condition until its core has set.

5. A method, according to any preceding claim, including arranging at least one reinforcing member inside the preformed tubular member prior to the introduction of the settable mass of flowable material.

6. A method, according to any preceding claim, including supporting the preformed tubular member in a mould of complementary shape whilst its core is setting.

7. A method of securing a rigid member to a support substantially as described herein with reference to and as illustrated in Figure 1 of the accompanying drawings.

8. A method of securing a rigid member to a support substantially as described herein with reference to and as illustrated in Figures 2 and 3 of the accompanying drawings.

9. A method of securing a rigid member to a support substantially as described herein with reference to and as illustrated in Figures 4 and 5 of the accompanying drawings.

10. A method of securing a rigid member to a support substantially as described herein with reference to and as illustrated in Figure 6 of the accompanying drawings.

11. A rigid member secured to a support by the method of any preceding claim.

12. A rigid member including a preformed self-supporting tubular member having a wall defining an outer surface of the rigid member, a keying member extending through the wall so that a first portion of the keying member extends into the interior of the preformed tubular member and is gripped by a set core of previously flowable material within the preformed tubular member, and a second portion of the keying member extends from the exterior of the rigid member for attachment to a support for the rigid member.

13. A rigid member, according to Claim 12, in which the first portion of the keying member has an aperture engaged by a portion of the set core.

14. A rigid member, according to claim 12 or 13, in which the second portion of the keying member has an aperture for engagement by the support.

15. A rigid member, according to any of Claims 12 to 14, in which the preformed tubular member is formed by extrusion.

16. A rigid member,according to any of Claims 12 to 15, in which the keying member extends through a slot in the wall of the preformed tubular member.

17. A rigid member, according to Claim 16, in which the keying member is a ring extending through the slot in the wall of the preformed tubular member.

18. A rigid member, according to any of Claims 12 to 17, in which a longitudinal series of keying means are positioned along the preformed tubular member.

19. A rigid member, according to any of Claims 12 to 18, in which a reinforcing member extends longitudinally within the preformed tubular member and is embedded in the set core.

20. A rigid member, according to Claim 19, in which the reinforcing member is in the form of a coil.

21. A rigid member, according to Claim 19, in which the reinforcing member extends diagonally between opposite internal faces of the preformed tubular member.

22. A rigid member, according to any of Claims 12 to 21, in which the preformed tubular member defines one or more longitudinal conduits which are not filled with the core of previously flowable material.

23. A rigid member, according to Claim 22, in which a portion of the preformed tubular member wall defining the outer surface of the rigid member also defines a wall of one of the longitudinal conduits.

24. A rigid member, according to Claim 23, in which the wall of the preformed tubular member is pierced to provide access to the longitudinal conduit.

25. A rigid member, according to any of Claims 12 to 24, in which the wall of the preformed tubular member defines an external channel.

26. A rigid member, according to any of Claims 12 to 25, in which a series of

preformed tubular members are connected together by end-to-end connectors.

27. A rigid member, according to Claim 26, in which the end-to-end connectors define an inlet means for the introduction of the flowable material into the interior of the preformed tubular members, and outlet means to ensure that each preformed tubular member is appropriately filled.

28. A rigid member, according to any of Claims 12 to 27, in which the preformed tubular member is formed as a one-piece extrusion.

29. A rigid member, according to claim 12 to 28, in which the preformed tubular member defines the outer surface of a kerbstone, and the second portion of the keying means is set in a bed of concrete, or the like, comprising the support.

30. A rigid member, according to Claim 29, in which the preformed tubular member defines a longitudinal rebate along an upper edge for supporting the adjacent edges of paving slabs.

31. A rigid member, according to Claim 22, or to Claims 26 or 27 as appendant to Claim 22, in which the longitudinal conduit forms a drainage channel communicating through a longitudinal slot with an upper surface of the preformed tubular member.

32. A rigid member, according to any of Claims 12 to 31, in which the said material is concrete.

33. A rigid member, according to any of Claims 12 to 31, in which the said material is a foamed plastics material.

34. A rigid member, according to any of Claims 12 to 33, in which the or each preformed tubular member is formed from plastics material.

35. A rigid member having keying means constructed and arranged substantially as described herein with reference to and as illustrated in Figure 1 of the accompanying drawings.

36. A rigid member having keying means constructed and arranged substantially as described herein with reference to and as illustrated in Figures 2 and 3 of the accompanying drawings.

37. A rigid member having keying means constructed and arranged substantially as described herein with reference to and as illustrated in Figures 4 and 5 of the accompanying drawings.

38. A kerbstone having keying means substantially as described herein with reference to and as illustrated in Figure 6 of the accompanying drawings.

39. A kerbstone, according to Claim 38, but having its preformed tubular member modified substantially as described herein with reference to and as illustrated in Figures 7, 8, 9, 10 or 11 of the accompanying drawings.

JEREMY R. GODDIN,
Chartered Patent Agent,
"Heyworth House,"
40*a* Kenilworth Road,
Coventry,
West Midlands CV3 6PG.
Agent for Applicants.

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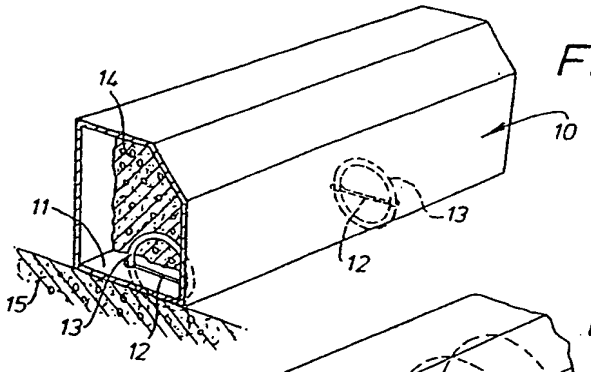

FIG. 1.

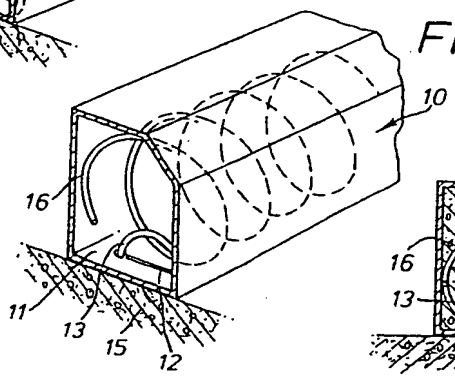

FIG. 2.

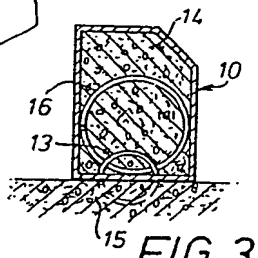

FIG. 3

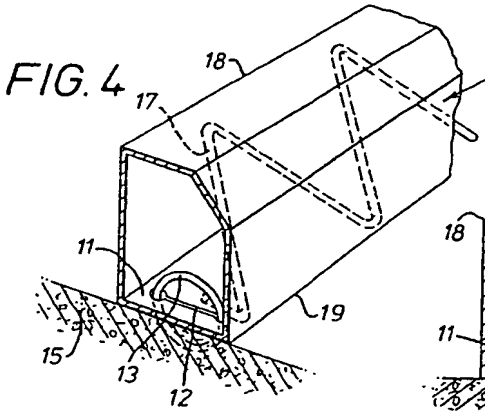

FIG. 4

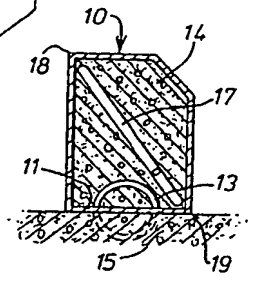

FIG. 5.

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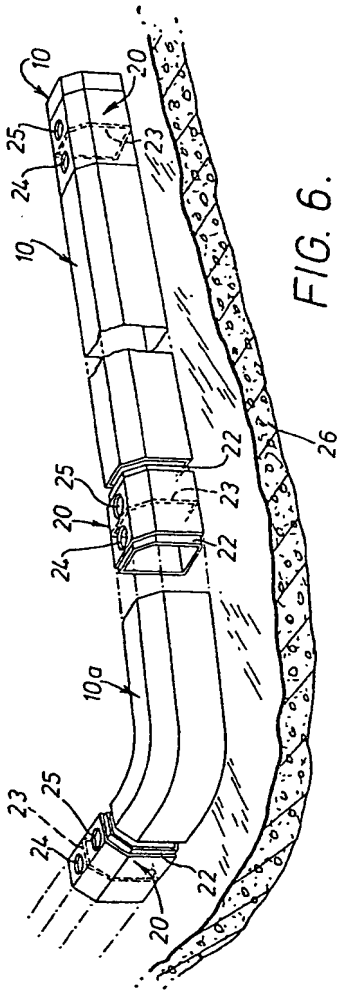

FIG. 6.

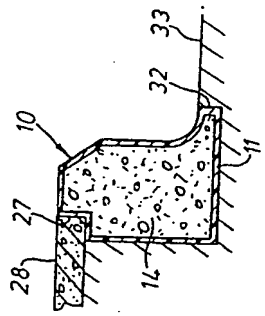

FIG. 8.

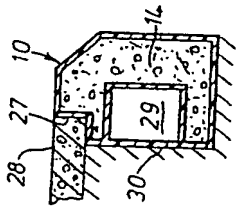

FIG. 9.

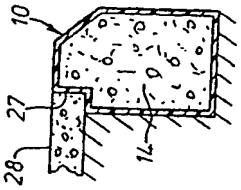

FIG. 7.

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FIG. 10.

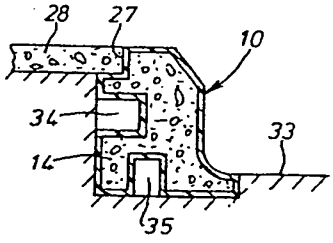
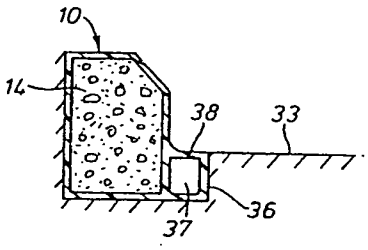


FIG. 11.



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